U.S. ENVIRONMENTAL PROTECTION AGENCY
EPA NEW ENGLAND

RECORD OF DECISION SUMMARY

FOR

EASTERN SURPLUS COMPANY SUPERFUND SITE

MEDDYBEMPS, MAINE

September 2000

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DECLARATION FOR THE RECORD OF DECISION

A. SITE NAME AND LOCATION

Eastern Surplus Company Superfund Site
Meddybemps, Washington County, Maine
MED981073711
EPA Lead
Entire Site, No Separate Operable Units

B. STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the Eastern Surplus Company Superfund (Site), in Meddybemps, Maine, which was chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended (CERCLA), 42 USC § 9601 et seq., and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR Part 300 et seq., as amended. The Director of the Office of Site Remediation and Restoration (OSRR) has been delegated the authority to approve this Record of Decision.

This decision was based on the Administrative Record, which has been developed in accordance with Section 113(k) of CERCLA, and which is available for review at the Calais Public Library and at the United States Environmental Protection Agency (EPA, EPA New England, OSRR Records Center in Boston, Massachusetts). The Administrative Record Index (Appendix C to the ROD) identifies each of the items comprising the Administrative Record upon which the selection of the remedial action is based.

The State of Maine concurs with the Selected Remedy.

C. ASSESSMENT OF THE SITE

The response action selected in this ROD is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

D. DESCRIPTION OF THE SELECTED REMEDY

This ROD sets forth the selected remedy for the entire Site at the Eastern Surplus Company Superfund Site, which involves the restoration of the contaminated groundwater using extraction and treatment. The remedy also allows for the use of enhancements to the groundwater extraction and treatment system, including the flushing of clean water and/or the injection of an in-situ treatment reagent to facilitate the removal and/or destruction of the contamination in the groundwater. Institutional controls will also be used to restrict the future use of the Site to

prevent ingestion of groundwater and disturbance of archaeological resources. This cleanup approach will prevent the off-site migration of contaminated groundwater and restore the aquifer to drinking water standards. The selected remedy is a comprehensive approach that addresses all current and potential future risks at the Site. As a result of the previous removal actions, the contaminated groundwater was the only medium requiring remedial action. Specifically, this remedial action includes the extraction of two separate plumes of contaminated groundwater and the treatment of the extracted water prior to re-infiltration. The remedial measures will prevent the migration of contaminated groundwater and restore the groundwater to drinking water standards.

The major components of this remedy are:

1. Extraction and treatment of the contaminated groundwater in two distinct plumes (northern plume and southern plume) will be performed. Groundwater from each of the two contaminated plumes will be extracted and treated by a common treatment system. Each extraction system will be designed to prevent off-site migration of contaminated groundwater and restore the aquifer to drinking water standards;

2. The groundwater extraction system will be enhanced by flushing of treated water and/or injection of a chemical reagent to facilitate the removal of contamination;

3. Land-use restrictions in the form of deed restrictions, such as easements and covenants to prevent ingestion of groundwater and disturbance of archaeological resources, will be used to control the two Site parcels agreed to be owned by the State of Maine. The State has agreed to impose institutional controls that run with the land for these parcels. Institutional controls shall also be implemented on those other Site properties upon which groundwater contamination is located until groundwater meets cleanup levels;

4. Long-term monitoring of groundwater, surface water, and sediments will be performed to evaluate the success of the remedial action. Additional biota sampling (fish, mammals, and plants) may also be performed, as necessary;

5. Portions of the mitigation of adverse effects upon the archaeological resources at the Site, caused by the non-time-critical removal action's soil excavation in 1999, will be performed as part of the remedial action; and

6. Five-year reviews will be performed to assess protectiveness until cleanup goals have been met.

This action represents the first and only anticipated operable unit for the Site. Both time-critical and non-time-critical removal actions were implemented at the Site to address contaminated soils, drums, cylinders, and other containers.

Previous removal actions at the Site addressed principal and low-level threat wastes. The selected response action addresses the remaining contamination found in groundwater by containing and treating the contamination to achieve groundwater restoration.

E. STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are applicable or relevant and appropriate to the remedial action (unless justified by a waiver), is cost-effective, and utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable.

This remedy also satisfies the statutory preference for treatment as a principal element of the remedy (i.e., reduce the toxicity, mobility, or volume of materials comprising principal threats through treatment).

Because this remedy will result in hazardous substances remaining in the groundwater on-site above levels that allow for unlimited use and unrestricted exposure (and groundwater and/or land use restrictions are necessary), a review will be conducted within five years after initiation of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

F. SPECIAL FINDINGS

None.

G. ROD DATA CERTIFICATION CHECKLIST

The following information is included in the Decision Summary section of this Record of Decision. Additional information can be found in the Administrative Record file for this Site.

1. Chemicals of concern (COCs) and their respective concentrations.

2. Baseline risk represented by the COCs.

3. Cleanup levels established for COCs and the basis for the levels.

4. How source materials constituting principal threats are addressed.

5. Current and reasonably anticipated future land assumptions and current and potential future beneficial uses of groundwater used in the baseline risk assessment and ROD.

6. Potential land and groundwater use that will be available at the Site as a result of the selected remedy.

7. Estimated capital, operation and maintenance (O&M), and total present worth costs; discount rate; and the number of years over which the remedy cost estimates are projected.

8. Key factor(s) that led to selecting the remedy (i.e. describe how the Selected Remedy provides the best balance of tradeoffs with respect to the balancing and modifying criteria; highlighting criteria key to the decision).

H. AUTHORIZING SIGNATURES

This ROD documents the selected remedy for the groundwater at the Eastern Surplus Company Superfund Site. The State of Maine Department of Environmental Protection concurs with the remedy.

Concur and recommended for immediate implementation:

U.S. Environmental Protection Agency

By: _____ Date: 9-28-2000
for Patricia L. Meaney, Director
Office of Site Remediation and Restoration
EPA New England

RECORD OF DECISION SUMMARY

A. SITE NAME, LOCATION AND BRIEF DESCRIPTION

Eastern Surplus Company Superfund Site
Meddybemps, Washington County, Maine
MED981073711
EPA Lead
Entire Site, No Separate Operable Units (2 previous removal actions)

The Eastern Surplus Company Site (Site) consists of a 4-5 acre parcel of land which is located in Meddybemps, Maine. The Site at the surface is adjacent to Meddybemps Lake to the north, the Dennys River to the east, and Route 191 to the south. The western boundary of the "surficial" Site is roughly defined by a fence adjacent to a private road. Prior to the two earlier removal actions, the Site was mostly covered by junk/surplus materials with any open spaces covered with vegetation. Some of the junk/surplus materials contained hazardous substances, which were released into the Site soils and further released into the groundwater. Two distinct plumes of contaminated groundwater have been identified. These are referred to as the "northern plume" and the "southern plume." The northern plume is within the surficial boundaries of the Site, while the southern plume extends beyond the surficial Site boundaries across Route 191. See Figure 1 for Site location.

The topography of the Site causes surface water to flow predominantly towards the Dennys River, although some portions of the Site also have surface water flow towards Meddybemps Lake. The Site is located at the outlet of Meddybemps Lake to the Dennys River. Meddybemps Lake is considered a high quality lake. The Dennys River is a class AA river that is one of the seven rivers in the State of Maine designated for the restoration of the Atlantic Salmon.

A more complete description of the Site can be found in Section 1 of the Remedial Investigation Report prepared by Tetra Tech NUS for EPA New England and released in July 1999.

B. SITE HISTORY AND ENFORCEMENT ACTIVITIES

1. History of Site Activities

The Site was historically used as farm land and was the location of a mill. In 1946, a portion of the Site was acquired by Mr. Harry Smith, Sr. (now deceased). The present owner of this portion of the Site is Harry J. Smith, Jr. The two Smiths owned and operated a business known as the Eastern Surplus Company, which stored and resold, among other things, supplies, materials and equipment acquired from the U.S. Department of Defense (DOD). The Eastern Surplus Company used the Site as a salvage/storage yard to store these items. Mr. Smith, Sr. also installed and used a hydroelectric station to generate power until

1966. Most business and storage activities ceased at the Site between 1973 and 1976. By the 1970's, thousands of compressed gas cylinders, drums, small containers, and other materials were present at the Site.

A more detailed description of the Site history can be found in Section 1.2 of the Remedial Investigation Report.

2. History of Federal and State Investigations and Removal and Remedial Actions

In 1985, the Maine Department of Environmental Protection (ME DEP) performed an inspection of the Site and identified the Site as an uncontrolled hazardous substance site in need of response. The ME DEP initiated a removal action to stabilize the Site. The ME DEP removed approximately 120 transformers and fenced the Site. The Maine State Police also swept the Site for munitions.

In 1986, EPA took over the removal action initiated by the ME DEP. The removal involved the inspection, evaluation, sampling (if necessary), and disposal (if necessary) of: 312 fifty-five gallon drums; 24 thirty gallon cans; 1,226 five gallons cans; 168 one hundred pound containers of calcium carbide; 1,182 miscellaneous small containers; 10 cubic yards of asbestos; and 2,674 compressed gas cylinders. EPA removed thousands of leaking drums and cans from the Site. EPA also provided oversight of DOD's removal of several thousand compressed gas cylinders. The EPA time-critical removal action was completed in 1990. The removal was successful at removing the hazardous substances above the ground surface.

The Site was proposed for inclusion on the National Priorities List (NPL) on October 2, 1995 (60 Fed. Reg. 51390). The Site was listed for final inclusion on the NPL on June 17, 1996 (61 Fed. Reg. 30510). In accordance with statutory requirements for NPL sites, the Agency for Toxic Substances and Disease Registry (ATSDR) completed a Preliminary Health Assessment for the Site. The ATSDR report recommended that further studies be performed to identify potential public health threats.

EPA began a remedial investigation and feasibility study (RI/FS) in 1996. After the RI/FS was completed in 1999, EPA issued a Proposed Plan for the final remedial action at the Site in August 1999.

Based upon the preliminary results of the RI/FS and previous investigations, and following the completion of an Engineering Evaluation/Cost Analysis (EE/CA), EPA signed an Action Memorandum in July 1998 to initiate a non-time-critical removal action (NTCRA) at the Site. The objective of the NTCRA was to eliminate the source of soil, groundwater and sediment contamination by removing soils with levels of contamination above the cleanup levels and initiating a source control groundwater extraction and treatment system to remove some of the contaminated mass in the aquifer and to prevent the off-site migration of the contamination. The soil portion of the NTCRA was completed in 1999. The groundwater

extraction and treatment system for the northern and southern plumes was completed in September 2000.

3. History of CERCLA Enforcement Activities

EPA issued a Unilateral Order to Matheson Gas Products in 1989 to remove eight commercial compressed gas cylinders. Matheson Gas Products complied with the order in 1989.

EPA notified the U.S. Department of Defense (DOD) of liability with respect to the Site and demanded reimbursement of the response costs in 1993. In 1995, EPA reached a settlement with DOD, as well as the U.S. General Services Administration, for the reimbursement of $1.4 million in past response costs.

In 1994, on behalf of EPA, the U.S. Department of Justice filed a complaint against the owner of a portion of the Site, Mr. Harry Smith, Jr., for refusing to comply with a CERCLA § 104(e) request for information. On February 25, 1995, the U.S. District Court for the District of Maine entered a $357,000 default judgment against Mr. Smith, Jr. The collection was referred to the Federal Litigation Unit of the Office of the United States Attorney for the District of Maine. To date, the amount has not been paid; as a result, the U.S. Attorney's office closed out the judgment as uncollectible.

On April 22, 1998, EPA notified owners of the two parcels of property that represent the surficial extent of the Site and DOD of their potential liability with respect to the Site and/or requested their participation in negotiating an agreement to perform or finance CERCLA response activities, including the RI/FS, NTCRA and remedial action. Negotiations with these potentially responsible parties (PRPs) were in fact commenced. These negotiations resulted in the development of a comprehensive cash-out settlement that has resolved the past and future liability of the PRPs. The cash-out settlement was embodied in a Consent Decree. The Consent Decree was approved by the U.S. District Court for the District of Maine in March 1999. The Consent Decree provides EPA with funding for future Site work and requires the landowner PRPs to transfer title of their properties within the "surficial" Site to the State of Maine.

The landowner PRPs have attended many of the public meetings at the Site. The landowner PRPs did not submit any comments as part of the comment period. DOD participated in the early removal actions and has remained informed of the cleanup activities. DOD also did not submit any comments as part of the comment period.

C. COMMUNITY PARTICIPATION

Throughout the EPA cleanup of the Site, community concern and involvement have been high. Since the Site's listing on the NPL, EPA has kept the community and other interested

parties informed of Site activities through informational meetings, fact sheets, press releases and public meetings. Below is a brief chronology of public outreach efforts.

- In June 1997, EPA released a community relations plan that outlined a program to address community concerns and keep citizens informed about and involved in remedial activities.

- On September 30, 1996, EPA held an informational meeting in Meddybemps to describe the plans for the Remedial Investigation and Feasibility Study. EPA has regularly attended the annual Meddybemps Lake Association meeting to update local residents with respect to Site activities.

- On June 9, 1997, May 21, 1998, September 22, 1998, October 28, 1998, May 26, 1999, and July 15, 1999, EPA held informational meetings in Meddybemps to discuss the results of the Remedial Investigation. EPA released 15 public information update fact sheets between 1996 and August 1999.

- On August 18, 1999, EPA made the administrative record available for public review at EPA's offices in Boston and at the Calais Public Library in Calais, Maine. This will be the primary information repository for local residents and will be kept up to date by EPA .

- EPA published a notice and brief analysis of the Proposed Plan in Bangor Daily News, Calais Advertiser, and Quoddy Times and made the plan available to the public at the Calais Public Library.

- From August 20 to September 20 1999, EPA held a 30 day public comment period to accept public comment on the alternatives presented in the Feasibility Study and the Proposed Plan and on any other documents previously released to the public. An extension to the public comment period was requested and as a result, it was extended to December 20, 1999.

- On August 19, 1999, EPA held an informational meeting to discuss the results of the Remedial Investigation and the cleanup alternatives presented in the Feasibility Study and to present the EPA's Proposed Plan to a broader community audience than those that had already been involved at the Site. At this meeting, representatives from EPA answered questions from the public.

- EPA has met with local residents, local officials, and the Meddybemps Lake Association to identify reasonably expected future land uses. A local survey identified the preferred future use of the Site as park or lot for a new church. While the consent decree will result in the transfer of the two parcels of property that represent the surficial extent of the Site, there are no restrictions on the future use of the property presently in place.

- On September 8, 1999, EPA held a public hearing to discuss the Proposed Plan and to

accept any oral comments. A transcript of this meeting is included in the Administrative Record. The summary of significant comments and EPA's responses are included in the Responsiveness Summary, which is part of this Record of Decision.

D. SCOPE AND ROLE OF OPERABLE UNIT OR RESPONSE ACTION

The selected remedy was developed by evaluating a variety of management of migration alternatives to obtain a comprehensive approach for Site remediation. In summary, the remedy provides for the restoration and containment of the contaminated groundwater using extraction and treatment. The remedy also allows for enhancements (flushing and/or chemical reagents) to the extraction and treatment system, if appropriate, to reduce the time period to achieve cleanup standards. Institutional controls will be implemented to control Site use, particularly groundwater ingestion, and environmental monitoring will be implemented to evaluate the success of the cleanup and provide information for the 5 year reviews. The State of Maine has agreed to impose institutional controls on the two parcels that it will own pursuant to the Consent Decree. The groundwater extraction system will address both plumes at the Site with a common treatment system.

The remedy described in this ROD is the third major cleanup action to be performed by EPA at this Site. From 1986-1990, EPA performed a time-critical removal action to remove the hazardous materials stored at the Site. This removal action included the sampling and removal of thousands of compressed gas cylinders, drums, and miscellaneous containers. This first action removed the majority of the hazardous materials stored at the Site. From 1998-present, EPA has been implementing a non-time-critical removal action or NTCRA to address the contamination in the Site soils that were acting as a source to groundwater and sediment contamination. The NTCRA also included a source control groundwater system to prevent the off-site migration of contaminated groundwater. The soil portion of the NTCRA is complete. All contaminated soils have been removed from the Site. The groundwater extraction and treatment system for the northern plume began operation in January 2000. The southern component of the groundwater extraction system began operation in September 2000. See Figures 2 and 3 for the NTCRA Areas of Excavation and Groundwater Extraction Wells.

The remedy described in this ROD will be the third and final cleanup action for the Site. The selected remedy addresses the continuation of the groundwater cleanup initiated by the NTCRA with an expansion of the scope to include restoration of the aquifer and the option for enhancements to reduce the time to success.

With respect to principal threats, the initial removal action and the recent NTCRA have addressed the highly contaminated source materials at the Site. With the possible exception of dense non-aqueous phase liquids (DNAPL) that may be present in the bedrock fractures (there has been no positive identification of DNAPL to date), there are no principal threat wastes remaining at the Site. In addition, low-level threat wastes present at the Site were removed as part of the previous removal actions that addressed the principal threat wastes. The selected

remedy targets the remaining groundwater contamination, which is the result of the previous infiltration of water through the contaminated soils. EPA has also evaluated the contamination in surface water, sediments, remaining on-site soils, and biota as part of this Record of Decision.

E. SITE CHARACTERISTICS

Chapter 1 of the Feasibility Study contains an overview of the Remedial Investigation. The significant findings of the Remedial Investigation are summarized below.

1. General Characteristics:

The Site at the surface consists of a 4-5 acre parcel of land located in Meddybemps, Maine. Surface water bodies form the eastern and northern boundaries, Route 191 forms the southern boundary, and the chain link fence installed by Maine DEP in 1985 approximates the western boundary. The Site ground surface once had debris/junk covering over 50% of the area, with thick vegetation covering the remaining areas. Some of the junk/surplus materials contained hazardous substances which were released into the Site soils and further released into the groundwater. Two distinct plumes of contaminated groundwater have been identified. These are referred to as the "northern plume" and the "southern plume." The northern plume is within the surficial boundaries of the Site, while the southern plume extends beyond the surficial Site boundaries across Route 191. A dam controls the outlet of Meddybemps Lake to the Dennys River. A small wetland exists adjacent to the Dennys River just below the dam. Most of the Site is above the flood plain as a steep bank runs along the Dennys River. Some flooding does occur in the northern corner of the Site adjacent to the dam. See Figure 1 for the location and plan view of the Site.

Portions of a former hydropower station that had been operated by the deceased former Site owner sits over the Dennys River at the southern end of the Site. Most of the liquid hazardous waste, drums, containers, and compressed gas cylinders were removed during the first removal action. As was discovered during the course of the RI, the Site still contained (after the first removal action) numerous compressed gas cylinders (some containing gas), munitions, and miscellaneous containers of liquids.

EPA performed a series of investigations to develop an understanding of the nature and extent of contamination at the Site. Each medium will be discussed separately below:

a. Soil:

The RI began with an initial field program to develop a preliminary understanding of the potential contaminants at the Site and to assist in the development of a more significant investigation plan. In September 1996, EPA's contractor collected 32 soil samples at stained areas, random locations, and locations of previous removal activity. These samples were analyzed for volatile organic compounds (VOCs), semi-volatile

organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), 22 metals (target analyte list or TAL list), and cyanide.

Using the initial data, EPA developed a sampling strategy for the first major field program. During October 1996, EPA's contractor collected over 500 samples for analysis on-site for select VOCs (headspace), PCBs, and metals using XRF. The majority of the samples were surface samples. However, a geoprobe was used to collect samples to depths of 12 feet. Also, soil gas samples were collected for on-site VOC analysis to assist in the characterization. A 25 foot grid was used for the soil gas results. Screening samples were selected based upon soil gas detects, visual evidence, and, for some, random selection. Based upon the results of the field screening, 60 sample locations were selected for off-site analysis for VOCs, SVOCs, pesticides, PCBs, TAL metals and cyanide. A subset of 20 samples was sent off-site for dioxin analysis. An additional 9 samples were obtained from two suspected source areas at the end of this program. See Figure 4 for the 1996 soil sampling locations.

To refine the understanding of the Site, 10 soil samples were collected and analyzed for PCBs during the installation of a monitoring well in April 1997, 12 additional surface soil samples were collected in June 1997 and analyzed for VOCs and TAL metals, and 16 samples were collected for VOC, SVOC, pesticide, PCB, and TAL analysis in October 1997 in areas where the Site owner had moved some of the non-hazardous debris/junk.

These initial sampling efforts identified several VOCs, PCBs, as wells as chromium and lead as the major contaminants at the Site. Tetrachloroethene, trichloroethene, and methylene chloride were the most significant of the detected VOCs, with toluene, xylenes, and ketones also present. SVOCs were present at lower concentrations and less frequently than VOCs. Levels of arsenic and cadmium were sporadically detected above background levels. Very low levels of dioxin were also detected in the soil. An area in the northeastern portion of the Site was identified as having elevated levels of VOCs and an area in the southeastern portion of the Site had elevated levels of PCBs.

Based upon these early results, EPA initiated a field program in October - November 1997 to collect samples for a treatability evaluation to assess thermal desorption technology and also to implement a vapor extraction field test in the northern VOC "hotspot". An additional 67 field samples were analyzed for VOCs and 32 samples were sent off-site for VOC, PCB, and TAL metal analysis during this program. See Figure 5 for the 1997 soil sampling locations.

In July 1998, EPA signed an Action Memorandum to approve the implementation of a non-time-critical removal action (NTCRA) at the Site. The NTCRA required the excavation and removal for off-site disposal of soils with PCE, TCE, methylene chloride, PCBs, chromium, lead, and cadmium above the specified cleanup levels. A pre-excavation field program was performed from August 1998 - October 1998. The

program included the removal of the remaining on-site junk/debris to allow access to the contaminated soils. Approximately 200 locations resulting in 850 surface and subsurface soil samples were collected and analyzed in an on-site mobile laboratory for VOCs, PCBs, and metals using XRF. Samples were collected to a depth of 25 feet below ground surface. These results provided a delineation of the excavation areas and also provided significant information regarding the distribution of contaminants at the Site. EPA collected additional soil samples during the excavation and removal program to manage the soil excavation and confirm the clean areas. See Figures 6 and 7 for the 1998 and 1999 soil sample areas.

The soil sampling programs at the Site identified several contaminants that represented a significant threat to human health from direct contact and leaching. As of November 1999, all of the soils with contamination above cleanup levels were excavated and removed from the Site. The remaining soils were either free of contamination or contained low levels of contamination. Over the course of the investigations, 38 organic compounds and many metals were detected at low concentrations outside the excavation areas. These contaminants were identified as contaminants of potential concern for consideration in the risk assessment. No significant source areas are believed to remain in the soil at the Site. Figure 8 shows the combination of all of the soil sampling locations. The soil data for the areas outside the excavations is presented in Table 1.

Prior to the NTCRA, on-site soils were the most significantly contaminated medium of the Site. Site-related contaminants were also detected in other media.

b. Surface Water and Sediments:

The Dennys River is a critical habitat for the Atlantic Salmon and is also within an area frequented by Bald Eagles. The Dennys River is a class AA water of the State of Maine. Meddybemps Lake has an area of approximately 6,765 acres with a maximum depth of 38 feet. Meddybemps Lake is classified as a Class GPA water by the State of Maine. Sediments and surface water were first sampled during the October 1996 field program. A total of 10 surface water locations in Meddybemps Lake and the Dennys River were identified and sampled for SVOCs, pesticides, PCBs, and TAL metals, and cyanide. A total of 40 sediment locations, 10 of which also included surface water, were identified and sampled for SVOCs, pesticides, TAL metals and cyanide, PCBs (homolog and 13 congeners), grain size and total organic carbon. 23 of the sediment samples were also analyzed for dioxin. Most samples were from depositional areas with some samples collected at depth. See Figure 9 for 1996 surface water and sediment sample locations.

In October 1997, 11 additional surface water samples were collected for VOC, SVOC, pesticides, PCBs, and TAL metal analysis. An additional 15 sediment samples were also collected for VOC, SVOC, pesticide, TAL metal, PCB (homolog and congeners), total organic carbon, and grain size analysis. In June 1998, 6 surface water

samples were collected for VOC and TAL metal analysis, and 7 sediment samples were collected for pesticides, PCBs (homologs and congeners), TAL metals, total organic carbon, and grain size. A final set of surface water and sediment samples were collected in June 1999 to address the infrequent detection of several contaminants that were identified in the human health risk assessment of contaminants of potential concern. At that time, 19 surface water samples were collected for VOC, SVOC, and TAL metal analysis, and 12 sediment samples were collected for pesticide, PCB (homolog and congener), and TAL metals analysis. See Figure 10 for 1997, Figure 11 for 1998, and Figure 12 for 1999 surface water and sediment sample locations. Figure 13 shows the combination of all samples to date.

No VOCs were detected in the surface water of Meddybemps Lake or the Dennys River. A small discharge area in a wetland adjacent to the Dennys River did have elevated levels of several VOCs (PCE, TCE, 1,2 DCE, and xylene). This area is directly below the VOC "hot spot" in the northeast corner of the Site. Results of the vapor diffusion sampling indicates that VOCs are discharging to the Dennys River, however, the dilution resulting from the mixing of the groundwater with the Dennys River reduces the VOC concentrations below detection limits. Tables 2 and 3 present a summary of the surface water and sediment results for the Site.

The only SVOC detected in surface water was bis (2-ethylhexyl) phthalate (DEHP). Two samples had concentrations (6 ug/l and 480 ug/l) at or above the MCL of 6 ug/l. The results were not consistent as the DEHP had not appeared in previous samples nor in subsequent samples. A June 1999 event targeted the area with the initial detection of 480 ug/l for extensive surface water sampling. No SVOCs were detected in June 1999. The infrequent detection of DEHP is indication that this compound is unlikely to be a significant Site contaminant.

Several metals have been detected in the surface water. Arsenic, antimony, and thallium were detected during the early sampling events. Thallium was detected in only 1 of 33 samples. The frequency of detection of arsenic and antimony was 2 detections in 33 samples. In addition, much like the SVOCs, arsenic and antimony were not present in the samples collected in June 1999. Low levels of lead, manganese, aluminum, and selenium have also been detected in surface water.

Low levels of VOCs (part per billion ug/kg) were detected in the sediments surrounding the Site. With respect to SVOCs, a range of polycyclic aromatic hydrocarbons (PAHs) as well as 4-methylphenol, carbazole, and 2-methylnapthalene were detected. The highest PAH concentrations were found at locations just below the highway bridge and adjacent to the Town of Meddybemps boat dock. In general, the SVOCs were in the ug/kg range of concentration with only a few areas exceeding 1 mg/kg for total PAHs.

PCBs were extensively detected in the sediments. In Meddybemps Lake, PCB concentrations were below 50 ug/kg. In Mill Pond, PCB concentrations were also quite low except for a small area beginning approximately 60 feet north (upstream) of the former hydrostation. PCB concentrations in this location exceeded 1 mg/kg and were as high a 9 mg/kg. These sediments were removed as part of the NTCRA. Downstream of the hydrostation, the PCBs were above background levels but below 1 mg/kg. The highest concentrations downstream was 500 ug/kg with over 80% of the concentrations below 30 ug/kg.

Pesticides were infrequently detected in the sediments. Low ug/kg concentrations of DDD, DDE, DDT, dieldrin, heptachlor, methoxychlor, and aldrin were detected.

A variety of metals were detected in the sediments. Several of the metals exceeded reference criteria as well as background. However, consistent patterns of elevated metals were not evident.

c. Groundwater:

The groundwater in the Meddybemps area, including the Site, is used as the primary drinking water source. While there are some dug wells that use the overburden groundwater as a drinking water source, most of the drinking water supply wells are in the bedrock. The bedrock at the Site is a combination of the Meddybemps granite with a gabbro-diorite intrusion. The surficial or overburden materials are glacial deposits that range from stratified beds of gravel, sand, and mixed sands/silt. A silty/clay layer appears in the southern portion of the Site.

The overburden at the Site ranges from 0 to 20 feet in thickness. The overburden in the northern portion of the Site is only seasonally saturated with a water table that fluctuates as much as 6 feet during the year. The bedrock is close to the surface in the northern portion of the Site. The overburden in the southern portion of the Site has a saturated thickness of several feet. The depth to bedrock is greater in this area..

Groundwater monitoring wells have been used to identify the Site geology and as the basis for groundwater chemistry and water levels. The United States Geological Survey (USGS) performed the initial groundwater investigation at the Site. The USGS installed 8 bedrock and 11 overburden monitoring wells in 1996 in addition to the 4 wells that had previously been installed at the Site. An additional 4 overburden wells were installed in April 1997 and an additional bedrock well in May 1998. EPA's contractor, Tetra Tech NUS, installed 2 overburden and 6 bedrock wells during October 1997. An additional, 3 monitoring wells and 6 bedrock extraction wells were installed as part of the NTCRA in 1999. See Figures 14, 15, 16, and 17 for the monitoring wells installed in 1996, 1997, 1998, and 1999 respectively. Figure 18 shows the locations of all monitoring and extraction wells through 1999.

Surface and down-hole geophysics were used to assist in the identification of potential groundwater producing fractures in the bedrock. Several pumping tests have also been performed to obtain an estimate of bedrock hydrology and overburden/bedrock interaction.

The groundwater in the northern portion of the Site exists as one aquifer with movement between the overburden and bedrock. The southern portion of the Site is more complex with evidence of overburden/bedrock communication but the groundwater is also influenced by confining layers.

Six groundwater monitoring events were completed during the RI/FS. Additional sampling was also performed in select wells during pump tests or the SVE pilot test. A complete set of analytical parameters were included in the first several sampling events (VOCs, SVOCs, TAL metals, pesticides/PCB). Samples were also collected for analysis for PCB homologs.

Two distinct areas of groundwater contamination or plumes were identified as part of the RI/FS. Sample results for the northern plume identified tetrachloroethene (PCE) as the major Site contaminant. Trichloroethene (TCE), 1,2 dichloroethene (DCE), 1,1,2 - trichloroethane, xylene, and methylene chloride were also detected in monitoring wells throughout the Site. PCE was detected at a maximum concentration of 6,700 ug/l and methylene chloride was detected at a maximum concentration of 4,300 ug/l in the northern plume. Much of the contamination in the northern plume is believed to be discharging to the Dennys River. A groundwater seep adjacent to the Dennys River contains the same VOCs as the plume. However, high levels of contamination have been detected in the deep bedrock. It is possible that some quantity of DNAPL could have entered the northern bedrock plume. See Figure 18 for the plan view of the northern and southern groundwater contaminant areas.

There is evidence that the plume is also moving to the deep bedrock. However, the bedrock wells across the Dennys River do not support any significant migration under the river. Low levels (single digit ug/l) of PCE are sporadically detected in the bedrock monitoring wells across the Dennys River from the northern plume. See Figures 19 and 20 for a cross-section view of the northern and southern plumes

Sample results for the southern plume were generally of lower concentration than the northern plume. However, PCBs were detected in the groundwater beneath and downgradient of the soil PCB "hot spot." PCBs were detected at a concentration of 3 ug/l in the southern plume and PCE was detected at a maximum concentration of 1,100 ug/l. The southern plume is also believed to be discharging to the Dennys River. The concentration gradient in the southern plume indicates that the highest concentrations are in the overburden and shallow bedrock. See Tables 4 and 5 for a summary of the groundwater results.

No residential wells have been significantly impacted by the Site contaminants. Every residential well sampled, except one, was free of site-related contaminants. A deep bedrock well adjacent to the Site does occasionally contain low levels of PCE. These levels are consistently below MCLs.

d. Air:

Three ambient air monitoring events were performed at the Site. No significant emissions of VOCs were detected outside of the work zones for the NTCRA. In addition, regular monitoring of the ambient air was performed during the NTCRA. The ambient air at the Site did not contain elevated levels of contaminants.

e. Fish and Mussels:

EPA retained the United States Fish and Wildlife Service (USFWS) to perform a biota sampling event to support the human health and ecological risk assessments. Fish and mussels from several locations in Meddybemps Lake, Dennys River and a reference site (East Machias River) were collected and analyzed for PCBs, metals, and pesticides. Figures 21 through 23 show the fish and mussel sample locations. Table 6 contains a summary of the fish and mussel data.

Mercury was detected at all locations, including background, supporting the area-wide problem discussed in the State of Maine fishing advisory. PCBs were detected at all locations with elevated levels detected adjacent to the Site. PCBs were detected at concentrations as high as 0.027 mg/kg in fillets and 0.168 mg/kg in whole body fish and up to 0.01 mg/kg in mussels. Arsenic, chromium, and copper were also detected at concentrations above background near the Site.

f. Cultural Resources:

The Site contains pre-historic Native American artifacts dating back as far as 5,000 years before present. These artifacts are buried in the soils at the Site. The recent history (past several hundred years) have significantly disturbed much of the Site; however, portions of the Site were found to contain archaeological resources in a setting that would make the portions of the Site eligible for listing on the National Register of Historic Places. A qualified archaeologist was retained to perform an assessment of the Site. EPA used this technical expertise in combination with consultations with the Maine Historic Preservation Commission (which is the designated State Historic Preservation Officer in accordance with the National Historic Preservation Act (NHPA)) and the Passamaquoddy Tribe to guide the cleanup actions at the Site. EPA followed the requirements of the NHPA during the implementation of the NTCRA. Some archaeological resources were unavoidably affected as part of the excavation and off-site disposal of contaminated soils. Pursuant to Section 106 of the National Historic

Preservation Act of 1966, as amended, 16 U.S.C. § 470f, EPA will be performing archaeological mitigation activities as part of this ROD. These mitigation obligations have been memorialized in in a Memorandum of Agreement for Recovery of Significant Information and Mitigation of Adverse Effect (MOA). The excavation portion of the mitigation requirements will be completed as part of the NTCRA. The long-term evaluation, documentation, and public outreach will be addressed as part of the ROD. Figure 24 shows the areas of the Site subject to major archaeological investigations. Figure 25 shows the portions of the Site that are National Register eligible.

2. Conceptual Site Model:

The sources of contamination, release mechanisms, exposure pathways to receptors for the groundwater, as well as other site-specific factors, are diagramed in a Conceptual Site Model (CSM). The CSM is a three-dimensional "picture" of Site conditions that illustrates contaminant sources, release mechanisms, exposure pathways, migration routes, and potential human and ecological receptors. It documents current and potential future Site conditions and shows what is known about human and environmental exposure through contaminant release and migration to potential receptors. The risk assessment and response action for the Site are based on this CSM, as described below.

The CSM for the Site identifies the drums, containers, and other stored material as the primary sources of contamination. The contamination was released into the soils due to dumping of liquids and by deterioration and leakage of containers. Much of the released hazardous substances entered the soils while some volatilized into the air. Precipitation and snow melt carried some of the contaminated soils into the surface water where deposition into the sediments occurred. Additionally, the contamination in the soils either drained due to gravity or was flushed by water into the overburden groundwater and eventually the bedrock groundwater. Site receptors including individuals and organisms: were in contact with containers and contaminated soils; ingested soil; may consume the groundwater; may come into contact with or ingest surface water or sediment; and may consume organisms that have accumulated contamination.

Principal threat wastes are those source materials considered to be highly toxic or highly mobile which generally cannot be contained in a reliable manner or would present a significant risk to human health or the environment should exposure occur. The manner in which principal threats are addressed generally will determine whether the statutory preference for treatment as a principal element is satisfied. Wastes generally considered to be principal threats are liquid, mobile and/or highly-toxic source material. The principal threat wastes at the Site have been removed as a result of the previous removal actions. It is possible that some quantity of DNAPL has migrated into the bedrock system (although currently there are no indications of such). This would represent an additional principal threat.

Low-level threat wastes are those source materials that generally can be reliably contained and that would present only a low risk in the event of exposure. Wastes that are generally considered to be low-level threat wastes include non-mobile contaminated source material of low to moderate toxicity, surface soil containing chemicals of concern that are relatively immobile in air or groundwater, low leachability contaminants, or low toxicity source material. Low-level threat wastes present at the Site were removed as part of the previous removal actions that addressed the principal threat wastes.

The contamination remaining after the Site's earlier removal actions is found in groundwater, surface water, sediments, and biota. As mentioned above, with the possible exception of some quantity of DNAPL in the bedrock, there are no principal threat or low-level wastes remaining at the Site. The remaining contaminated media are the focus of this ROD.

F. CURRENT AND POTENTIAL FUTURE LAND AND RESOURCE USES

The most recent land use of the Site was as a junk yard/surplus materials storage. However, since the earlier removal actions have removed all surficial materials from the Site, the Site is presently an undeveloped well-graded lot located in the midst of an area of mixed land use. The Site is surrounded by permanent and seasonal homes surrounding Meddybemps Lake. The Site is situated in a location that would be considered a prime building lot but for the contamination.

Reasonably anticipated future uses of the Site are quite limited. Under the Consent Decree for the recovery of past and future Site costs from the potentially responsible parties (PRPs), the PRP owners of two parcels of property that represent the surficial extent of the Site will transfer ownership of their parcels to the State of Maine. The current groundwater contamination will require institutional controls to prevent consumption of groundwater during the time period required for restoration of the groundwater. Future excavation activities in the northern portion of the Site will also need to be restricted due to the presence of the archaeological resources. The State of Maine has agreed to accept ownership of the two parcels that represent the surficial extent of the Site and subsequently grant restrictions or covenants that run with the land to impose these institutional controls. The local community and Town of Meddybemps have expressed interests in having a park established given the scenic location of the Site and/or a conservation land for the preservation of the archaeological resources.

The parcel adjacent to the "surficial" Site, south of Route 191, also contains groundwater contamination. This area is not subject to the Consent Decree and therefore is not restricted and could have a number of future uses, including residential, commercial, or industrial uses. Reasonably anticipated future uses of adjacent land and in surrounding areas include mostly residential use with the possibility of some light commercial and agricultural uses. Blueberry fields are the major agricultural activity in the area.

The future land use assumptions for the Site and surrounding areas are based on current land

use, the remote location of the Site, discussions with local officials, and the legal restrictions of the Site settlement.

The current uses of the groundwater at the Site and surrounding areas are for agricultural and residential purposes. The potential beneficial use of the groundwater at the Site could be as a water supply for maintaining a park. It is unlikely that the groundwater at the Site would be used as a water supply in the near future (30 years) given the planned land use restrictions. The areas surrounding the Site are dependent upon groundwater for residential and agricultural water. This is based on the lack of a public water supply and good quality bedrock aquifer.

The current use(s) of the surface water at the Site and surrounding areas are as a water supply, fishery, and for swimming and recreation. The potential beneficial use of the surface water at the Site and surrounding areas is the same. This is based on classification of Meddybemps Lake as a GPA surface water and the Dennys River as a Class AA river.

	Current On-Site Use	Current Adjacent Use	Reasonable Potential Beneficial Use of Site	Basis for Potential Beneficial Use	Time Frame to Achieve Potential Beneficial Use
Land	junk yard	residential, seasonal	recreational, conservation land	consent decree, land owner	present
Shallow Groundwater	none	dug wells for water supply	non-potable water supply	geology, consent decree	present
Deep Groundwater	none	drilled wells for water supply	non-potable water supply	consent decree, ROD	present
Surface Water	fishing, seasonal water supply, swimming	fishing, seasonal water supply, swimming	fishing, seasonal water supply, swimming	current use	present

Community and stakeholder input was sought and incorporated through active outreach during the RI/FS. EPA held numerous meetings, held private discussions with local residents and Town Officials, and solicited the views of the PRPs. The local community performed a survey regarding future land use. The results were that, after cleanup of the Site, use of the land as a park or for a new church were the preferred activities.

G. SUMMARY OF SITE RISKS

A baseline risk assessment was performed to estimate the probability and magnitude of potential adverse human health and environmental effects from exposure to contaminants associated with the Site assuming no remedial action was taken. While the ecological risk assessment support a decision of no further remedial action, the results of the human health risk assessment provide the basis for taking action and identifies the contaminants and exposure pathways that need to be addressed by the remedial action. The human health and ecological risk assessments followed a four step process: 1) hazard identification, which identified those hazardous substances which, given the specifics of the Site were of significant concern; 2) exposure assessment, which identified actual or potential exposure pathways, characterized the potentially exposed populations, and determined the extent of possible exposure; 3) effects assessment, which considered the types and magnitude of adverse effects associated with exposure to hazardous substances; and 4) risk characterization and uncertainty analysis, which integrated the three earlier steps to summarize the potential and actual risks posed by hazardous substances at the Site, including carcinogenic and non-carcinogenic risks and a discussion of the uncertainty in the risk estimates. A summary of those aspects of the human health risk assessment which support the need for remedial action is discussed below followed by a summary of the environmental risk assessment. It is important to note that the NTCRA resulted in the excavation and off-site disposal of the contaminated soils from the Site prior to the completion of the ROD. As such, only those soils outside the excavation areas were considered in the risk evaluation. As of November 1999, all soils above the NTCRA cleanup levels had been removed from the Site and the excavated areas have been filled with clean fill, graded, and seeded to promote vegetation and reduce erosion.

1. Human Health Risk Assessment

Of the 50 chemicals detected in the northern groundwater plume at the Site, 15 were chosen as chemicals of potential concern (COPCs) for evaluation in the human health risk assessment. For the southern groundwater plume, 15 of the 36 detected chemicals were selected as COPCs. COPCs were also selected for soil, sediments, surface water, and fish tissue. The COPCs were selected to represent potential site-related hazards based on toxicity, concentration, frequency of detection, and mobility and persistence in the environment and can be found in Tables 2.1 - 2.9 of the Human Health Risk Assessment. From this, a subset of the chemicals were identified in the Feasibility Study as presenting a significant current or future risk and are referred to as the chemicals of concern in this ROD and summarized in Tables 7 and 8. These tables contain the exposure point concentrations used to evaluate the reasonable maximum exposure scenario (RME) in the baseline risk assessment for the chemicals of concern. Estimates of average or central tendency exposure concentrations for the chemicals of concern and all chemicals of potential concern can be found in Tables 3.1 - 3.9 of the Human Health Risk Assessment.

Table 7
Summary of Chemicals of Concern and Medium-Specific Exposure Point Concentrations

Scenario Timeframe: Future
Medium: Groundwater (northern plume)
Exposure Medium: Groundwater (northern plume)

Exposure Point	Chemical of Concern	Concentration Detected		Units	Frequency of Detection	Exposure Point Concentration (EPC)	EPC Units	Statistical Measure
		Min	Max					
ingestion of groundwater	antimony	30	30	ug/l	1/16	9.0	ug/l	maximum of within well average concentrations
	arsenic	5	12	ug/l	3/17	4.4	ug/l	maximum of within well average concentrations
	chromium	1.2	61	ug/l	10/16	31	ug/l	maximum of within well average concentrations
	manganese	4.3	2,820	ug/l	17/17	1,510	ug/l	maximum of within well average concentrations
	bis (2-ethylhexyl) phthalate	2	5	ug/l	2/5	3.5	ug/l	maximum of within well average concentrations
	1,1,2 trichloroethane	11	11	ug/l	1/22	11	ug/l	maximum of within well average concentrations
	1,2 dichloroethene	2	170	ug/l	15/20	86	ug/l	maximum of within well average concentrations
	chloromethane	1	55	ug/l	3/22	55	ug/l	max
	methylene chloride	1	4,100	ug/l	9/22	4,100	ug/l	max
	tetrachloroethene	0.4	6,700	ug/l	20/22	4,000	ug/l	maximum of within well average concentrations
	trichloroethene	1	380	ug/l	16/22	185	ug/l	maximum of within well average concentrations

Key

ug/l: microgram per liter or parts per billion
95% UCL: 95% upper confidence limit
max: maximum concentration

The table presents the chemicals of concern (COCs) and exposure point concentration for each of the COCs detected in groundwater (*i.e.*, the concentration that will be used to estimate the exposure and risk from each COC in the groundwater). The table includes the range of concentrations detected for each COC, as well as the frequency of detection (i.e., the number of times the chemical was detected in the samples collected at the Site), the exposure point concentration (EPC), and how the EPC was derived. The table indicates that manganese and tetrachloroethene were the most frequently detected COCs in the northern plume groundwater at the Site. The maximum concentration of most COCs was based upon the temporal average concentrations at each well location.

Table 8
Summary of Chemicals of Concern and
Medium-Specific Exposure Point Concentrations

Scenario Timeframe: Future
Medium: Groundwater (southern plume)
Exposure Medium: Groundwater (southern plume)

Exposure Point	Chemical of Concern	Concentration Detected		Units	Frequency of Detection	Exposure Point Concentration (EPC)	EPC Units	Statistical Measure
		Min	Max					
ingestion of groundwater	arsenic	0.8	3.3	ug/l	4/29	2.6	ug/l	maximum of within well average concentrations
	cadmium	0.43	16	ug/l	4/29	4.4	ug/l	maximum of within well average concentrations
	chromium	1.1	92	ug/l	10/29	23.5	ug/l	maximum of within well average concentrations
	PCBs (total)	0.003	3.35	ug/l	5/8	3	ug/l	maximum of within well average concentrations
	bis (2ethyl hexyl) phthalate	1	190	ug/l	4/16	97.5	ug/l	maximum of within well average concentrations
	1,1 dichloroethene	3	3	ug/l	1/36	3	ug/l	max
	cis-1,3-dichloropropene	0.3	0.3	ug/l	1/36	0.3	ug/l	max
	methylene chloride	1	26	ug/l	6/36	15.5	ug/l	maximum of within well average concentrations
	tetrachloroethene	0.8	1,000	ug/l	36/36	965	ug/l	maximum of within well average concentrations
	trichloroethene	0.4	100	ug/l	10/36	36.7	ug/l	maximum of within well average concentrations

Key

ug/l microgram per liter or ppb: parts per billion
95% UCL: 95% upper confidence limit
max: maximum concentration

The table presents the chemicals of concern (COCs) and exposure point concentration for each of the COCs detected in groundwater (*i.e.*, the concentration that will be used to estimate the exposure and risk from each COC in the groundwater). The table includes the range of concentrations detected for each COC, as well as the frequency of detection (i.e., the number of times the chemical was detected in the samples collected at the Site), the exposure point concentration (EPC), and how the EPC was derived. The table indicates that tetrachloroethene was the most frequently detected COC in the southern plume groundwater at the Site. The maximum concentration of most COCs was based upon the temporal average concentrations at each well location.

Potential human health effects associated with exposure to the chemicals of potential concern were estimated quantitatively or qualitatively through the development of several hypothetical exposure pathways. These pathways were developed to reflect the potential for

exposure to hazardous substances based on the present uses, potential future uses, and location of the Site. The Site is a junk/surplus salvage yard. The area surrounding the Site is mixed residential, seasonal recreational, agricultural, and undeveloped forest. There were no restrictions in place prior to the RI/FS that would have prevented future residential use of the land. The Site is located in a desirable location along Meddybemps Lake for future development and for recreational access to the Dennys River. The area is well known for the recreational fishery. Smallmouth bass and landlocked salmon are the most commonly sought game fish along with perch and pickerel.

The following is a brief summary of just the exposure pathways that were found to present a significant risk. A more thorough description of all exposure pathways evaluated in the risk assessment including estimates for an average exposure scenario can be found in Chapters 2 and 3 of the Human Health Risk Assessment.

For contaminated groundwater, ingestion of 2 liters/day, 350 days/year for 24 yrs was assumed for an adult. The same assumptions over a 6 year period was used for a child exposure. For dermal exposures to contaminated groundwater, it was assumed that an adult and child would contact groundwater while showering or bathing. For both a child and adult, the entire surface area was assumed to contact groundwater. The surface area exposed for an adult was 18,000 cm^2 and for a child was 6600 cm^2. The frequency and duration of exposure for an adult was 350 days/yr for 24 years. For a child, the frequency and duration was 350 days/yr for 6 years.

Excess lifetime cancer risks were determined for each exposure pathway by multiplying a daily intake level with the chemical specific cancer potency factor. Cancer potency factors have been developed by EPA from epidemiological or animal studies to reflect a conservative "upper bound" of the risk posed by potentially carcinogenic compounds. That is, the true risk is unlikely to be greater than the risk predicted. The resulting risk estimates are expressed in scientific notation as a probability (e.g., 1 x 10^{-6} or 1/1,000,000) and indicate (using this example), that an average individual is not likely to have greater than a one in a million chance of developing cancer over 70 years as a result of site-related exposure (as defined) to the compound at the stated concentration. All risks estimated represent an "excess lifetime cancer risk" - or the additional cancer risk on top of that which we all face from other causes such as cigarette smoke or exposure to ultraviolet radiation from the sun. The chance of an individual developing cancer from all other (non-site-related) causes has been estimated to be as high as one in three. EPA's generally acceptable risk range for site-related exposure is 10^{-4} to 10^{-6}. Current EPA practice considers carcinogenic risks to be additive when assessing exposure to a mixture of hazardous substances.

A summary of the cancer toxicity data relevant to the chemicals of concern is presented in Table 9 below.

Table 9
Cancer Toxicity Data Summary

Pathway: Ingestion, Dermal

Chemical of Concern	Oral Cancer Slope Factor	Dermal Cancer Slope Factor	Slope Factor Units	Weight of Evidence/Cancer Guideline Description	Source	Date (MM/DD/YYYY)
arsenic	1.5	1.5	(mg/kg)/day	A	IRIS	05/04/99
bis (2ethyl hexyl) phthalate	0.014	0.014	(mg/kg)/day	B2	IRIS	2/24/99
1,1 Dichloroethene	0.6	0.6	(mg/kg)/day	C	IRIS	03/21/99
1,1,2 trichloroethene	0.057	0.057	(mg/kg)/day	C	IRIS	03/21/99
chloromethane	0.013	0.013	(mg/kg)/day	C	HEAST	1997
methylene chloride	0.0075	0.0075	(mg/kg)/day	B2	IRIS	03/14/99
tetrachloroethene	0.052	0.052	(mg/kg)/day	B2	EPA-NCEA	03/21/99
trichloroethene	0.011	0.011	(mg/kg)/day	B2	EPA-NCEA	03/21/99
PCBs	2	2	(mg/kg)/day	B2	IRIS	03/03/99
cis 1,3-dichloropropene	0.18	0.18	(mg/kg)/day	B2	HEAST	1997

Key
— : No information available
IRIS: Integrated Risk Information System, U.S. EPA

EPA Group:
A - Human carcinogen
B1 - Probable human carcinogen - Indicates that limited human data are available
B2 - Probable human carcinogen - Indicates sufficient evidence in animals and inadequate or no evidence in humans
C - Possible Human Carcinogen
D - Not classifiable as a human carcinogen
E - Evidence of noncarcinogenicity

This table provides carcinogenic risk information which is relevant to the contaminants of concern in groundwater. At this time, slope factors are not available for the dermal route of exposure. In the absence of dermal toxicity factors, EPA has devised a simplified paradigm for making route-to-route (oral-to-dermal) extrapolations for systemic effects. This process is outlined in Appendix A of the Risk Assessment Guidance for Superfund (U.S. EPA, 1989). Primarily, it accounts for the fact that most oral RfDs and slope factors are expressed as the amount of substance administered per unit time and body weight, whereas exposure estimates for the dermal pathway are expressed as an absorbed dose. To address this, EPA uses the dose-response relationship obtained from oral administration studies and makes an adjustment for gastrointestinal (GI) absorption efficiency to represent the toxicity factor in terms of an absorbed dose. If GI absorption is less than 50%, adjustment of the oral toxicity value is not recommended because this comparatively small adjustment impacts a level of accuracy that is not supported by the scientific literature. Slope factors for COCs detected at this Site do not need to be adjusted for absorption efficiency and thus oral slope factors are equal to dermal slope factors.

In assessing the potential for adverse effects other than cancer, a hazard quotient (HQ) is calculated by dividing the daily intake level by the reference dose (RfD) or other suitable benchmark. Reference doses have been developed by EPA and they represent a level to which an individual may be exposed that is not expected to result in any deleterious effect. RfDs are derived from epidemiological or animal studies and incorporate uncertainty factors to help ensure that adverse health effects will not occur. A HQ $\leq$ 1 indicates that a receptor's dose of a single contaminant is less than the RfD, and that toxic noncarcinogenic effects from that chemical are unlikely. The Hazard Index (HI) is generated by adding the HQs for all chemical(s) of concern that affect the same target organ (e.g. liver) within or across those media to which the same individual may reasonably be exposed. A HI $\leq$ 1 indicates that toxic noncarcinogenic effects are unlikely. A summary of the noncarcinogenic toxicity data relevant to the chemicals of concern is presented in Table 10 below.

Table 10
Non-Cancer Toxicity Data Summary

Pathway: Ingestion, Dermal

Chemical of Concern	Chronic/ Sub-chronic	Oral RfD Value	Oral RfD Units	Dermal RfD	Dermal RfD Units	Primary Target Organ	Combined Uncertainty/ Modifying Factors	Sources of RfD: Target Organ	Dates of RfD: Target Organ (MM/DD/YYYY)
antimony	chronic	0.0004	mg/kg-day	0.00006	mg/kg-day	blood	1000	IRIS	02/23/1999
arsenic	chronic	0.0003	mg/kg-day	0.0003	mg/kg-day	skin	3	IRIS	05/04/1999
cadmium	chronic	0.001	mg/kg-day	0.000025	mg/kg-day	kidney	10	IRIS	05/21/1999
chromium	chronic	0.003	mg/kg-day	0.000075	mg/kg-day	kidney	900	IRIS	05/04/1999
lead	subchronic	NA	mg/kg-day	NA	mg/kg-day	CNS	NA	NA	NA
manganese	chronic	0.024	mg/kg-day	0.00144	mg/kg-day	CNS	1	IRIS	02/24/1999
bis(2ethyl hexyl) phthalate	chronic	0.02	mg/kg-day	0.02	mg/kg-day	liver	1000	IRIS	02/24/1999
1,1,2 trichloroethane	chronic	0.004	mg/kg-day	0.004	mg/kg-day	blood	1000	IRIS	03/21/1999
1,2 dichloroethene	chronic	0.009	mg/kg-day	0.009	mg/kg-day	liver	1000	HEAST	09/29/1998
1,1 dichlorethene	chronic	0.1	mg/kg-day	0.1	mg/kg-day	liver	1000	IRIS	03/21/1999
ethylbenzene	chronic	0.1	mg/kg-day	0.1	mg/kg-day	liver/ kidney	1000	IRIS	03/21/1999

methylene chloride	chronic	0.06	mg/kg-day	0.06	mg/kg-day	liver	100	IRIS	03/14/1999
tetrachloro-ethene	chronic	0.01	mg/kg-day	0.01	mg/kg-day	liver	1000	IRIS	03/21/1999
trichloroethene	?	0.006	mg/kg-day	0.006	mg/kg-day	cardio/ liver/ CNS	?	EPA/ NCEA	03/21/1999
total PCBs	chronic	0.00002	mg/kg-day	0.00002	mg/kg-day	skin/eye	300	IRIS	03/14/1999
cis 1,3 dichloro-propene	chronic	0.0003	mg/kg-day	0.0003	mg/kg-day	kidney	10000	IRIS	03/21/1999

Key

IRIS: Integrated Risk Information System, U.S. EPA
NA: not applicable
CNS: central nervous system
HEAST: Health Effects Assessment Summary Tables
EPA/NCEA: National Center for Environmental Assessment

This table provides non-carcinogenic risk information which is relevant to the contaminants of concern in groundwater. Oral RfDs (generally based on an administered dose) are adjusted for GI absorption efficiency to represent a toxicity factor which is based on an absorbed dose (called the Dermal RfD here). Absorption efficiency factors are presented in Table 5.1 and 6.1 of the Baseline Risk Assessment.

Tables 11 and 12 depict the carcinogenic risk summary for the chemicals of concern in groundwater evaluated to reflect present and potential ingestion of the groundwater by future resident corresponding to the reasonable maximum exposure (RME) scenario. Tables 13-16 depict the non-carcinogenic risk summary for the chemicals of concern in groundwater evaluated to reflect present and potential ingestion of the groundwater by future resident corresponding to the reasonable maximum exposure (RME) scenario. Only those exposure pathways deemed relevant to the remedy being proposed are presented in this ROD. Readers are referred to Chapter 5 of the Human Health Risk Assessment for a more comprehensive risk summary of all exposure pathways evaluated for all chemicals of potential concern and for estimates of the central tendency risk.

Table 11

Risk Characterization Summary - Carcinogens

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk		
				Ingestion	Dermal	Exposure Routes Total
groundwater	groundwater	northern plume - tap water	arsenic	1.34×10^{-4}	4.62×10^{-7}	1.34×10^{-4}
			bis (2-ethyl hexyl) phthalate	9.97×10^{-7}	1.16×10^{-6}	2.16×10^{-6}
			1,1,2 trichloroethane	1.28×10^{-5}	7.97×10^{-7}	1.36×10^{-5}
			chloromethane	1.46×10^{-5}	2.79×10^{-7}	1.48×10^{-5}
			methylene chloride	6.26×10^{-4}	1.57×10^{-5}	6.42×10^{-4}
			tetrachloroethene	4.23×10^{-3}	1.5×10^{-3}	5.73×10^{-3}
			trichloroethene	4.14×10^{-5}	4.31×10^{-6}	4.57×10^{-5}
			(Total)	5.06×10^{-3}	1.52×10^{-3}	6.58×10^{-3}
					Groundwater Risk Total =	6.58×10^{-3}
					Total Risk =	**6.58×10^{-3}**

Key
— : Toxicity criteria are not available to quantitatively address this route of exposure.

This table provides risk estimates for the significant routes of exposure. These risk estimates are based on a reasonable maximum exposure and were developed by taking into account various conservative assumptions about the frequency and duration of a child and adult's exposure to groundwater, as well as the toxicity of the COCs. The total risk level is estimated to be 6.58×10^{-3}. This risk level indicates that if no clean-up action is taken, an individual would have an increased probability of 7 in 1000 of developing cancer as a result of site-related exposure to the COCs.

Table 12

Risk Characterization Summary - Carcinogens

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk		
				Ingestion	Dermal	Exposure Routes Total
groundwater	groundwater	southern plume - tap water	arsenic	7.78×10^{-5}	2.69×10^{-7}	7.81×10^{-5}
			total PCB congeners	1.25×10^{-4}	7.77×10^{-4}	9.02×10^{-4}
			bis (2-ethyl hexyl) phthalate	2.78×10^{-5}	3.23×10^{-5}	6.0×10^{-5}
			1,1 dichloroethene	3.66×10^{-5}	3.35×10^{-6}	4.0×10^{-5}
			methylene chloride	2.37×10^{-6}	5.94×10^{-8}	2.43×10^{-6}
			tetrachloroethene	1.02×10^{-3}	3.62×10^{-4}	1.38×10^{-3}
			trichloroethene	8.22×10^{-6}	8.54×10^{-7}	9.07×10^{-6}
			cis-1,3-dichloropropene	1.1×10^{-6}	4.01×10^{-8}	1.14×10^{-6}
			(Total)	1.30×10^{-3}	1.18×10^{-3}	2.48×10^{-3}
					Groundwater Risk Total =	2.48×10^{-3}
					Total Risk =	**2.48×10^{-3}**

This table provides risk estimates for the significant routes of exposure. These risk estimates are based on a reasonable maximum exposure and were developed by taking into account various conservative assumptions about the frequency and duration of a child and adult's exposure to groundwater, as well as the toxicity of the COCs. The total risk level is estimated to be 2.48×10^{-3}. This risk level indicates that if no clean-up action is taken, an individual would have an increased probability of 3 in 1000 of developing cancer as a result of site-related exposure to the COCs.

Table 13

Risk Characterization Summary - Non-Carcinogens

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Non-Carcinogenic Hazard Quotient		
					Ingestion	Dermal	Exposure Routes Total
groundwater	groundwater	northern plume - tap water	antimony	blood	2.92	0.0375	2.96
			arsenic	skin	1.87	0.00359	1.87
			chromium	kidney	1.34	0.206	1.54
			manganese	CNS	8.04	0.258	8.3
			1,2 dichloroethene	liver	1.22	0.0409	1.26
			methylene chloride	liver	8.74	0.122	8.86
			tetrachloroethene	liver	51.1	10.1	61.2
			trichloroethene	cardiovas/ liver/CNS	3.94	0.228	4.17
			(Total)		79.2	11	90.2
						Skin Hazard Index =	**1.87**
						Blood Hazard Index =	**2.9**
						CNS Hazard Index =	**12.5**
						Cardiovascular Hazard Index =	**4.2**
						Kidney Hazard Index =	**1.5**
						Liver Hazard Index =	**75.5**

This table provides hazard quotients (HQs) for each route of exposure and the hazard index (sum of hazard quotients) for all routes of exposure. The estimated HIs for most organ endpoints exceeds a hazard index of concern and indicates that the potential for adverse noncancer effects could occur from exposure to contaminated groundwater. CNS - central nervous system.

Table 14
Risk Characterization Summary - Non-Carcinogens

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Non-Carcinogenic Hazard Quotient		
					Ingestion	Dermal	Exposure Routes Total
ground-water	ground-water	northern plume - tap water	manganese	CNS	1.72	0.151	1.87
			methylene chloride	liver	1.87	0.0713	1.94
			tetrachloroethene	liver	11	5.89	16.8
			(total)		14.6	6.11	20.7
						CNS Hazard Index =	**1.8**
						Liver Hazard Index =	**18.8**

Table 15
Risk Characterization Summary - Non-Carcinogens

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Non-Carcinogenic Hazard Quotient		
					Ingestion	Dermal	Exposure Routes Total
ground-water	ground-water	southern plume - tap water	arsenic	skin	1.09	0.00209	1.09
			cadmium	kidney	1.12	0.0432	1.17
			chromium	kidney	1	0.154	1.16
			total PCB congeners	skin/eye	19.6	67.9	87.5
			bis (2ethyl hexyl)phthalate	liver	0.623	0.403	1.03
			tetrachloroethene	liver	12.3	2.43	14.8
			(Total)		35.7	71.0	10.7
						Skin Hazard Index =	**88.6**
						Kidney Hazard Index =	**2.32**
						Liver Hazard Index =	**15.8**
						Eye Hazard Index =	**87.5**

Table 16
Risk Characterization Summary - Non-Carcinogens

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Non-Carcinogenic Hazard Quotient		
					Ingestion	Dermal	Exposure Routes Total
groundwater	groundwater	southern plume - tap water	total PCB congeners	skin/eye	4.19	39.7	43.9
			tetrachloroethene	liver	2.64	1.42	4.07
			(Total)		6.84	41.1	48
						Skin Hazard Index =	**43.9**
						Liver Hazard Index =	**4.1**
						Eye Hazard Index =	**43.9**

Lead was identified as a COPC in groundwater from the southern plume (maximum concentration = 90 ug/L). The Integrated Exposure and Uptake Biokinetic (IEUBK) lead model was used to evaluate the hazard potential posed by exposure of young children less than 7 years of age to groundwater. The arithmetic mean of lead in the southern plume groundwater (3.81 ug/L) was used in the model along with the average Site surface soil lead concentration or the average Site subsurface soil lead concentration. For air and paint concentrations, default parameters were adopted. The default geometric standard deviation was also used. The outcome of the model revealed that 0.03% of children are expected to have blood-lead levels greater than 10 ug/dl under the scenario using the surface soil lead concentration. Under the scenario using the subsurface soil lead concentration, the IEUBK model estimates that 0% of children are expected to have blood-lead levels exceeding 10 ug/dl. It is EPA policy to protect 95% of the sensitive population against blood lead levels in excess of 10 ug/dl blood. The IEUBK results for this Site are well within acceptable levels.

The only pathways which exceed EPA's acceptable cancer risk range and/or a hazard quotient of concern are ingestion of groundwater in the northern and southern plumes by a resident and ingestion of fish (due to mercury, which is not considered site-related). No unacceptable risks were identified for the remaining soils on-site, sediments, or surface water.

Lifetime cancer risk estimates for the northern plume groundwater are 6.6×10^{-3}. Eighty seven percent of this risk is due to tetrachloroethene. Methylene chloride contributes to about 9% of the total risk. EPA's hazard index of concern is exceeded for children and adults for

several target organs. The major contributors to these exceedances are tetrachloroethene, methylene chloride and manganese. Antimony, 1,1,2-trichloroethane, methylene chloride, tetrachloroethene and trichloroethene exceed federal MCLs. Aluminum, iron, manganese, 1,1,2-trichloroethane, 1,1-dichloroethane, chloromethane, tetrachloroethene, trichloroethene and xylene exceed the Maine drinking water standards (Maine Maximum Exposure Guidelines (MEGs)).

The lifetime cancer risk estimates for the southern plume is 2.5×10^{-3}. Fifty-six percent of the risk is due to tetrachloroethene, and 36% is due to PCBs. EPA's hazard index of concern for children and adults is exceeded for several target organs. Most of this risk is due to PCBs and tetrachloroethene. For the southern plume, the following compounds exceed EPA's MCLs: cadmium, PCBs, bis(2-ethylhexyl)phthalate, methylene chloride, tetrachloroethene and trichloroethene. The following compounds exceed Maine MEGs: aluminum, cadmium, iron, manganese, PCBs, bis (2-ethylhexyl)phthalate, bromomethane, tetrachloroethene, and trichloroethene.

The lifetime cancer risk estimates for fish consumption was within the acceptable risk range (10^{-4} to 10^{-6}). The exposure pathways regarding fish consumption exceeded a hazard quotient of concern of one for only one contaminant (mercury). The hazard quotients for site-related contaminants (including PCBs) were all at or below a hazard quotient of one. Since the fish tissue concentrations for mercury were no different from background locations, the contamination is not considered site-related. The State of Maine has issued public health advisories regarding fish consumption in the lakes and streams of Maine due to mercury.

There are several uncertainties associated with any risk assessment. Some uncertainties bias risk estimates low while others bias risk high. EPA's general approach is to choose conservative but reasonable values for exposure variables so that true risks are unlikely to be higher than risks estimated by the baseline risk assessment. Below is a brief discussion of the major uncertainties associated with the risk assessment for this Site. A more complete discussion can be found in Chapter 6 of the Baseline Risk Assessment.

- Some of the analytical results used for the exposure point concentration in the risk assessment are isolated, elevated detections of chemical that may not be representative of the typical chemical concentration that a receptor is exposed to. For instance, some of the metals detected in groundwater and surface water samples may be the result of suspended solids and fines entrained in samples as a result of the sampling technique and thus not representative of true exposures. This uncertainty is likely to contribute to an overestimation of health risks.

- The inclusion of estimated maximum possible concentration (EMPC) data introduces uncertainty. Sediment EMPC PCB results were included because of the limited number of samples. EMPC results could result in an over-or under-estimate of risk.

- In evaluating potential risks associated with exposure to groundwater, the data sets were limited to groundwater samples that were located within a contaminant plume. This obviously reduces the size of the data set being evaluated and elevates the exposure point concentrations by eliminating the relatively unaffected samples from the data set. Exposure to groundwater is a point source exposure. Therefore, evaluating risks associated with the contaminated zone may overestimate risks to the typical receptor but reduce the likelihood of declaring the water safe for use when it may actually be unsafe for some users.

- In evaluating potential risks associated with exposure to sediments, the data sets consisted of all sediment samples that were collected within specific areas. Most of the sediment samples were submerged, and it is unlikely that exposure to these sediment would result in significant direct contact exposure. However, potential risks due to sediments were evaluated as if they were soils. Therefore, the amount of exposure and risks due to the sediments are most likely overestimated.

- For media at some study areas, fewer than ten samples were available. As a result, maximum values rather than 95% upper confidence limits on the mean were used for exposure point concentrations. This is likely to result in an overestimate of the concentration to which individuals are typically exposed and an overestimation of the risk since it is unlikely that an individual would be exposed to the maximum concentration over the entire exposure period.

2. Ecological Risk Assessment

The objective of the ecological risk assessment was to identify and estimate the potential ecological impacts associated with the chemicals of concern (COCs) at the Site. The assessment focused on the potential impacts of chemicals of concern found in the surface soils, surface waters, sediments and fish and mussel tissues to aquatic and semiaquatic birds and mammals that inhabit or are potential inhabitants of the Site, which includes Meddybemps Lake, Mill Pond and the Dennys River. Readers are referred to the Final Ecological Risk Assessment (Weston, 1999) for a more comprehensive risk summary of all exposure pathways and estimates. The technical guidance for performance of the ecological risk assessment comes primarily from the following sources: *Framework for Ecological Risk Assessment* (U.S. EPA, 1992), the *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments* (U.S. EPA, 1997); and the *Guidelines for Ecological Risk Assessment* (U.S. EPA, 1998).

Risks were evaluated through the comparison of site-related contaminants detected in Site media to media-specific ecological effect levels, which are defined as the concentration of a particular contaminant in a particular medium below which no adverse effects to ecological receptors are likely to occur. Ecological effect levels were developed based on established

numerical criteria (e.g., federal and state Ambient Water Quality Criteria (AWQC)) or on information obtained from the literature (Long et al., 1995; Persaud et al., 1996; and Ingersoll et al., 1996). These effect levels can be used to assess potential risks to ecological receptors by comparing the effect levels to existing contaminant levels in the on-site media. In addition, fish and mussel tissue data were collected at areas potentially impacted by the migration of site-related contaminants since both Meddybemps Lake and the Dennys River maintain active fisheries. The fish and mussel data were incorporated into quantitative exposure modeling for the great blue heron, osprey and river otter.

Media that were investigated as part of this remedial investigation included the surface waters, groundwater, surface sediments, surface soils, and fish and mussel tissues. Based on likely exposure pathways, as described in Section 3.2.2 of the Ecological Risk Assessment (Weston, 1999), for species observed or expected to occur at the Site, the following media and biota are of potential concern to ecological resources:

- Surface soils at the Site,
- Surface waters, sediments and fish and mussel tissues within Meddybemps Lake and the Denny River.

a. Identification of Chemicals of Concern

Both the RI and ERA were conducted based upon sampling performed by Roy F. Weston in 1996 and 1997, and monitoring data collected by Tetra Tech NUS in 1998 and completed in July of 1999. Additional data was collected in the summer of 1999 (Tetra Tech NUS, 1999), subsequent to the RI and ERA reports, as part of ongoing monitoring at the Site. Also, during the summer of 1999, a non-time-critical removal action (NTCRA) took place, which included the excavation and off-site disposal of surface soils and sediments contaminated with polychlorinated biphenyls (PCBs) and VOCs. Some additional samples were taken in the excavated area and analyzed for PCBs in September of 1999 (Tetra Tech NUS, 1999).

Data from 1996-1997 and 1999 were pooled to calculate mean concentration (AVG), standard deviation (STD), maximum, and 95% upper confidence limits (UCL). Data were grouped by medium: surface water, sediment and soil.

The following criteria were used to summarize the data:

- All J-qualified data were assumed to be valid data.
- All U-qualified data represented non-detect data for the parameters evaluated, and one-half of the sample quantitation limit was used to estimate the statistical

parameters (AVG, STD and UCL).

- Maximum values were calculated using only detected concentrations (this occasionally resulted in a maximum value that was less than the mean).

- Sample duplicates were treated as separate individual samples.

Tables 17 through 26 identify the revised list of COCs for surface water and sediment within Meddybemps Lake, Mill Pond and Dennys River and surface soil at the Site based on sampling performed prior to 1999, and sampling performed in the summer and fall of 1999 following the NTCRA. Table 27 provides a summary of the benchmark concentrations used for each media. The following is a discussion of the revised list of COCs.

Table 17
Distribution and Selection of Chemicals of Concern (COC), Meddybemps Lake Surface Water

COC (ug/L)	Background Samples		Meddybemps Lake Samples			Benchmark ug/L	Benchmark Reference	Max > Benchmark	UCL > Benchmark
	Average	95% UCL	Maximum	Average	95% UCL				
Aluminum	43	66	852	283	577	87	a	Y	Y
Barium	2.02	2.51	5.90	2.94	4.49	4.00	b	Y	Y
Lead	0.67	0.93	3.50	2.38	3.31	0.50	a	Y	Y
Silver	0.98	1.42	1.10	0.89	1.25	0.36	b	Y	Y

a - benchmarks from Maine Statewide Water Quality (1998) - Endpoint = CCC; values of certain metals adjusted to hardness of 25 mg/L

b - benchmarks from Suter and Tsao (1996) - Endpoint = Second Chronic Values (Tier II)

NA - Not Available

NE - Not Evaluated

Y - Yes

N - No

Table 18
Data Comparison: Meddybemps Lake Surface Water

COC (ug/L)	1996-1997 Surface Water		1999 Surface Water	
	Average (1)	Max (2)	Average (1)	Max (2)
Aluminum	523	852	43	51
Barium	4.38	5.90	1.50	ND
Lead	2.15	3.50	2.60	3.2
Silver	0.82	ND	0.80	1.1

Notes:

(1) Average is the arithmetic mean of all samples in the group, using 1/2 the listed detection limit for non-detects.

(2) Maximum is the maximum detected concentration within the sample group.

NA indicates that the chemical was not included in analysis for the sample.

ND - Not detected in the sample group. Average values in such cases are driven by 1/2 the detection limit.

Table 19
Distribution and Selection of Chemicals of Concern (COC)
Dennys River/Mill Pond Surface Water

COC (ug/L)	Background Samples		Dennys River/Mill Pond Samples			Benchmark ug/L	Benchmark Reference	Max > Benchmark	UCL > Benchmark
	Average	95% UCL	Maximum	Average	95% UCL				
Trichloroethene	ND	ND	65	5.39	11	47	a	Y	N
bis (2-Ethylhexyl) phthalate	4.33	10	480	24	60	360	b	Y	N
Copper	1.6	2.09	3.70	0.95	1.27	2.36	b	Y	N
Selenium	2.15	2.86	10.00	2.55	3.25	5	b	Y	N

Notes:

a - benchmarks from Suter and Tsao (1996) - Endpoint = Second Chronic Values (Tier II)

b - benchmarks from Maine Statewide Water Quality (1998) - Endpoint = CCC; values of certain metals adjusted to hardness of 25 mg/L

Y- Yes

N- No

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